

Instructions



Aluminum Husky™ 2150 LP Air-Operated Diaphragm Pumps

3A8693B

EN

2-inch air-operated double-diaphragm (AODD) pump for fluid transfer. Not for use in sanitary applications. For professional use only.

120 psi (0.8 MPa, 8 bar) Maximum Fluid Working Pressure

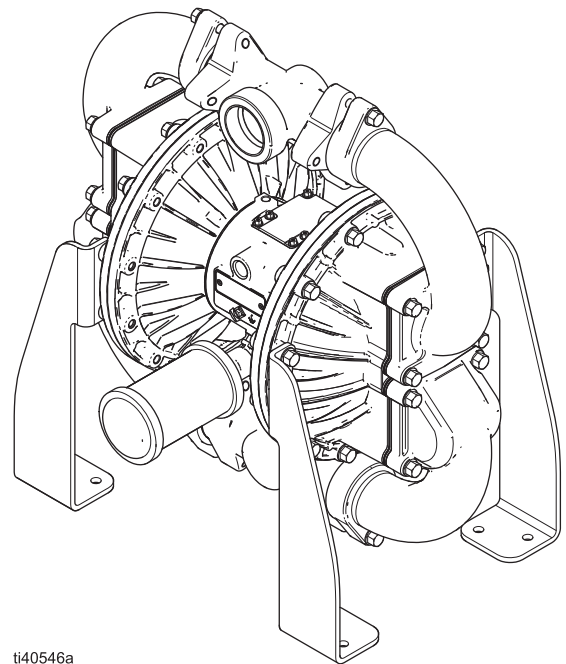
120 psi (0.8 MPa, 8bar) Maximum Air Input Pressure

See page 2 for model information, including approvals.

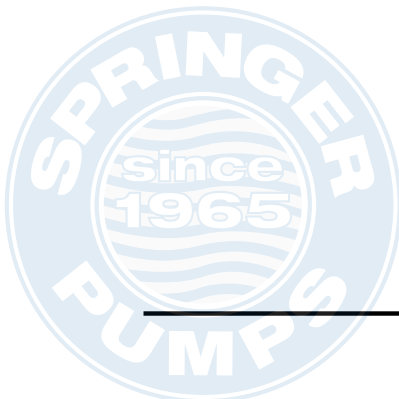


Important Safety Instructions

Read all warnings and instructions in this manual before using the equipment.
Save these instructions.






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Models








Part	Configuration Number*	Approvals
25U609	2150LP-PA01AA1FB-BBNBN	   II 2 GD Ex h IIC 66°C...82°C Gb Ex h IIIC T82°C Db
25U610	2150LP-PA01AA1FB-BSPBN	
25U611	2150LP-PA01AA1FB-BTPBN	
25U612	2150LP-PA01AA1FB-BGEBN	
25U613	2150LP-PA01AA1FB-BCRBN	
25U614	2150LP-PA01AA2FB-BBNBN	
25U615	2150LP-PA01AA2FB-BSPBN	
25U616	2150LP-PA01AA2FB-BTPBN	
25U617	2150LP-PA01AA2FB-BGEBN	
25U618	2150LP-PA01AA2FB-BCRBN	









ATEX T-code rating is dependent on the temperature of the fluid being pumped. Fluid temperature is limited by the materials of the pump interior wetted parts. See **Technical Specifications** for the maximum fluid operating temperature for your specific pump model.

* To define material codes, see **Configuration Number Matrix**, page 5.

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

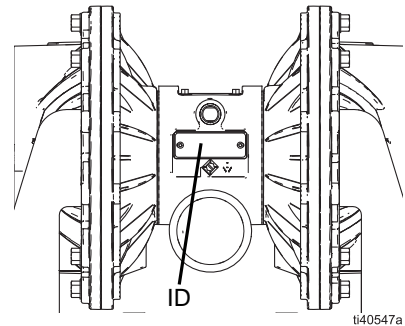
 <h2 style="margin: 0;">WARNING</h2>	
 	<p>EQUIPMENT MISUSE HAZARD</p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> • Do not operate the unit when fatigued or under the influence of drugs or alcohol. • Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See Technical Specifications in all equipment manuals. • Use fluids and solvents that are compatible with equipment wetted parts. See Technical Specifications in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer. • Turn off all equipment and follow the Pressure Relief Procedure when equipment is not in use. • Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only. • Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards. • Make sure all equipment is rated and approved for the environment in which you are using it. • Use equipment only for its intended purpose. Call your distributor for information. • Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces. • Do not kink or over bend hoses or use hoses to pull equipment. • Keep children and animals away from work area. • Comply with all applicable safety regulations.
   	<p>FIRE AND EXPLOSION HAZARD</p> <p>Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> • Use equipment only in well-ventilated area. • Eliminate all ignition sources, such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking). • Ground all equipment in the work area. See Grounding instructions. • Keep work area free of debris, including solvent, rags and gasoline. • Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present. • Use only grounded hoses. • Stop operation immediately if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem. • Keep a working fire extinguisher in the work area. • Route exhaust away from all ignition sources. If diaphragm ruptures, fluid may be exhausted with air.

 <h1 style="margin: 0;">WARNING</h1>	
  	<p>PRESSURIZED EQUIPMENT HAZARD</p> <p>Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.</p> <ul style="list-style-type: none"> • Follow the Pressure Relief Procedure when you stop spraying/dispensing and before cleaning, checking, or servicing equipment. • Tighten all fluid connections before operating the equipment. • Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.
	<p>PRESSURIZED ALUMINUM PARTS HAZARD</p> <p>Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.</p> <ul style="list-style-type: none"> • Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents. • Do not use chlorine bleach. • Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.
	<p>TOXIC FLUID OR FUMES HAZARD</p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> • Read Safety Data Sheets (SDSs) to know the specific hazards of the fluids you are using. • Route exhaust away from work area. If diaphragm ruptures, fluid may be exhausted into the air. • Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
	<p>BURN HAZARD</p> <p>Equipment surfaces and fluid that is heated can become very hot during operation. To avoid severe burns:</p> <ul style="list-style-type: none"> • Do not touch hot fluid or equipment.
	<p>PERSONAL PROTECTIVE EQUIPMENT</p> <p>Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> • Protective eyewear, and hearing protection. • Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Configuration Number Matrix

Check the identification plate (ID) for the part number and configuration number of your equipment. Use the following matrix to define the components of your equipment.

Record your equipment part number and configuration number to assist you when ordering replacement parts:



Sample Configuration Number: 2150LP-PA01AA1FB-BBNBN

2150	LP	P	A01A	A1	FB	-B	BN	BN
Pump Model	Wetted Section Material	Drive	Center Section and Air Valve Material	Manifolds	Seats	Checks	Diaphragms	Gaskets

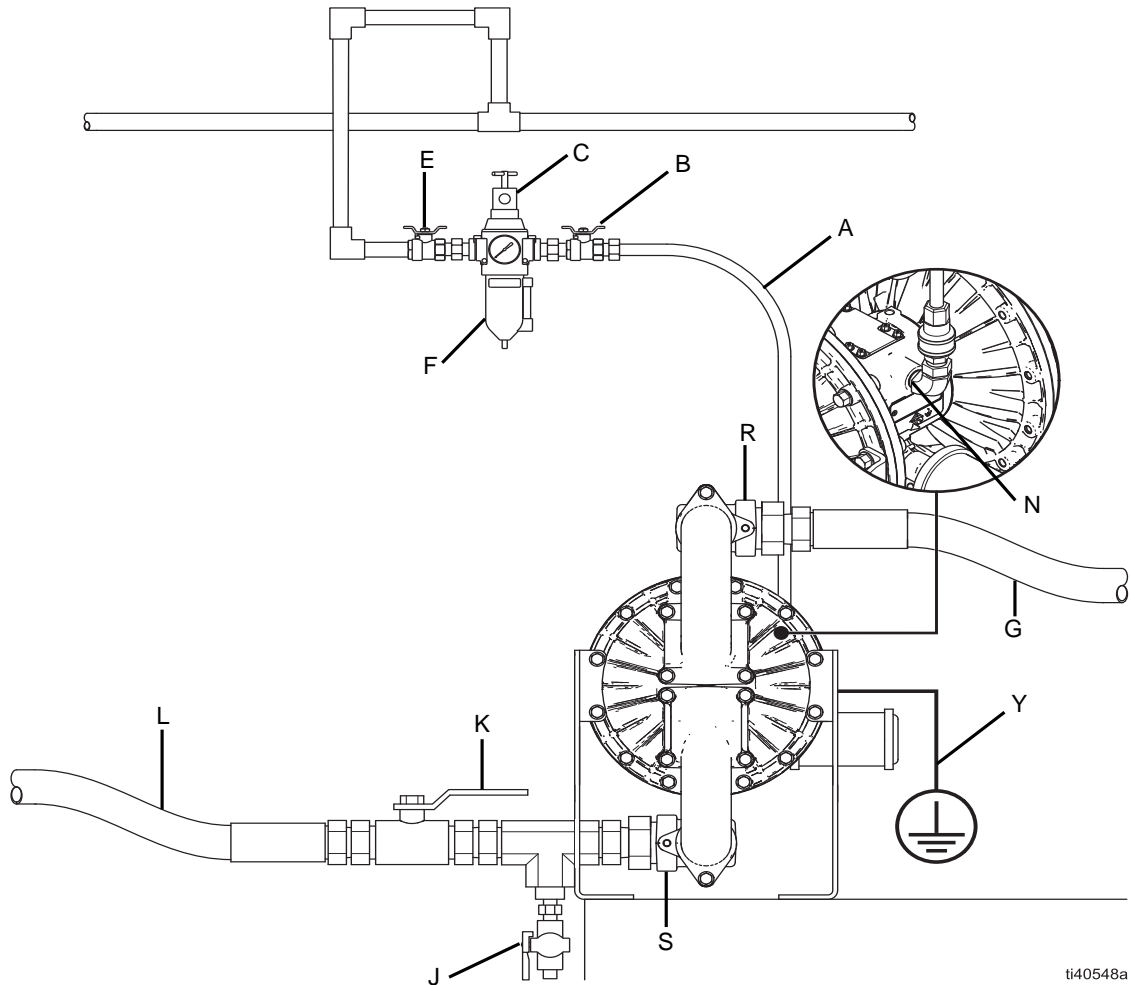
NOTE: Some combinations are not possible. See **Models**, page 2, or check with your local supplier.

Pump	Wetted Section Material		Drive Type		Center Section and Air Valve Material		Manifolds	
2150	LP	Large Particle	P	Pneumatic	A01A	Aluminum	A1	Aluminum, NPT
							A2	Aluminum, BSPT

Seat Material		Checks		Diaphragm Material		Gaskets	
FB	303 Stainless Steel with Buna-N Seals	-B	Buna-N Overmolded 303 Stainless Steel Flapper	BN	Buna-N	BN	Buna-N
				CR	Polychloroprene		
				GE	Geolast		
				TP	TPE		
				SP	Santoprene®		



Typical Installation



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FIG. 1: Typical Installation

KEY:

- A Air supply line
- B Bleed-type master air valve (for pump) (required, not supplied)
- C Air regulator (required, not supplied)
- E Master air valve (for accessories)
- F Air line filter
- G Flexible, conductive fluid supply line
- J Fluid drain valve (required, not supplied)
- K Fluid shutoff valve
- L Flexible, conductive fluid outlet line

- N* Air inlet port
- R‡ Fluid inlet port
- S‡ Fluid outlet port
- Y Ground wire

* 1/2 in. npt(f) port.

‡ For pumps with connection code TN: 2-11.5 in. npt(f).
For pumps with connection code TB: 2-11 in. bspt(f).

♦ Can be oriented to a vertical or horizontal position. See **Orientation of Fluid Inlet and Outlet Ports**, page 11.

Installation

General Information

- A typical installation is shown in FIG. 1. It is only a guide for selecting and installing system components. Contact your Graco distributor for assistance in planning a system to suit your needs.
- Always use genuine Graco parts and accessories.
- Reference numbers and letters in parentheses refer to the callouts in the figures.

Before First Use

After you unpack the equipment, and before you use it for the first time, check and torque all external fasteners. See **Torque Sequence**, page 29. After the first day of operation, retorque the fasteners.

Check and tighten all air and fluid connections before operating the equipment. Replace worn or damaged parts as needed.

NOTICE

Firmly tighten all connections to avoid air or fluid leaks. To avoid equipment damage, do not over-torque the fasteners on the equipment. See **Torque Sequence**, page 29.

Grounding



Pump: Connect a ground wire and clamp (Y) as shown in FIG. 2. To order a ground wire and clamp, order part number 238909. Loosen the grounding screw (W). Insert one end of a 12-gauge (1.5 mm²) or thicker ground wire behind the grounding screw and tighten the screw securely. Connect the clamp end of the ground wire to a true earth ground.

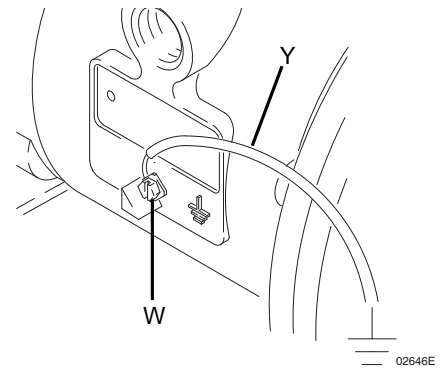


FIG. 2: Grounding

- **Air and fluid lines:** Use only conductive lines with a maximum of 500 ft (150 m) combined line length to ensure grounding continuity. Check electrical resistance of lines. If total resistance to ground exceeds 29 megohms, replace line immediately.
- **Air compressor:** Follow manufacturer's recommendations.
- **Fluid supply container:** Follow local codes and regulations.
- **Solvent pails used when flushing:** Follow local codes and regulations. Use only conductive metal pails, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts grounding continuity.



Mounting



The equipment is heavy (see **Technical Specifications** for specific weights). If the equipment must be moved, follow the **Pressure Relief Procedure**, page 12, and have two people lift the equipment by grasping the outlet manifold securely, or use appropriate lifting equipment to lift by the outlet manifold. Never have one person move or lift the equipment.

Rubber Foot Mounting Kit 236452 is available to reduce noise and vibration during operation (*purchase separately*).

1. Ensure that the mounting surface is level and can support the weight of the equipment, lines, and accessories, as well as the stress caused during operation.
2. Mount the equipment on a level surface and secure the equipment to the mounting surface. For all mountings, ensure that the equipment is bolted directly to the mounting surface. See **Dimensions**, page 31, for dimensions of the mounting holes for your equipment.

NOTE: For ease of operation and service, mount the equipment so the air valve cover, air inlet, and fluid inlet and outlet ports are easily accessible.

Air Exhaust Ventilation

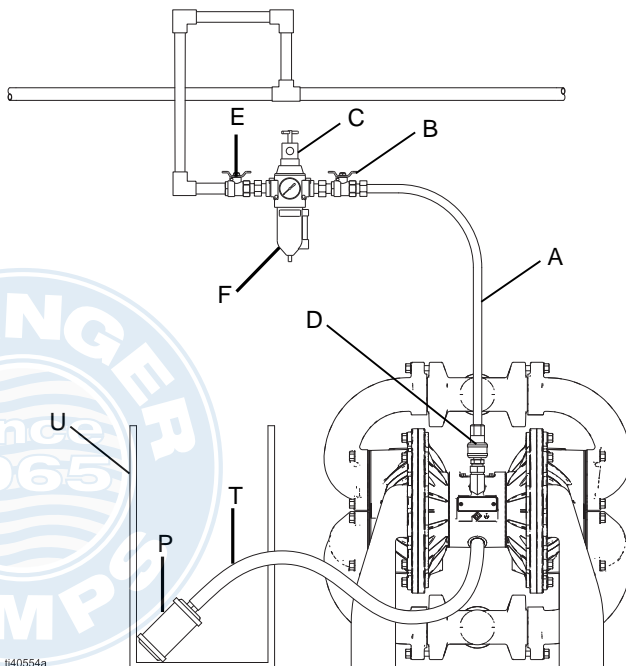


Be sure the system is properly ventilated for your type of installation. Exhaust must be vented to a safe place, away from people, animals, food handling areas, and all sources of ignition when pumping flammable or hazardous fluids. Diaphragm rupture can cause the fluid being pumped to exhaust with the air. Place a grounded container at the end of the air exhaust line to catch the fluid. See FIG. 3.

NOTE: The air exhaust port is 3/4 npt(f). Do not restrict the air exhaust port. Excessive exhaust restriction can reduce equipment performance.

To provide a remote exhaust:

1. Remove the muffler (P) from the air exhaust port. See FIG. 3.
2. Install a conductive, grounded air exhaust line (T) and connect the muffler (P) to the other end of the line. The minimum size for the air exhaust line is 3/4 in. (19 mm) inner-diameter. If a line longer than 15 ft (4.57 m) is required, use a larger diameter line. Avoid sharp bends or kinks in the line.
3. Place a conductive, grounded container (U) at the end of the air exhaust line to catch fluid in case of a diaphragm rupture. See FIG. 3.



KEY:

- A Air supply line
- B Bleed-type master air valve (for pump) (required, not supplied)
- C Air regulator (required, not supplied)
- D Air line quick disconnect
- E Master air valve (for accessories)
- F Air line filter
- P Muffler
- T Conductive air exhaust line
- U Conductive container for air exhaust

FIG. 3: Air Exhaust Ventilation

Accessories

Install the following accessories in the order shown in FIG. 1, using adapters as necessary.

Air Line

- **Bleed-type master air valve (B):** required in your system to relieve air trapped between it and the air motor when the valve is closed.



A bleed-type master air valve (B) is required in the system to relieve air trapped between this valve and the equipment. Trapped air can cause the equipment to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin. See FIG. 1.

Be sure the valve is easily accessible from the equipment and located downstream from the air regulator.

- **Air regulator (C):** to control pump speed and fluid outlet pressure. Locate it close to the equipment.
- **Air line filter (F):** removes harmful dirt and moisture from compressed air supply.
- **Master bleed-type air valve (E):** isolates air line accessories for servicing. Locate upstream from all other air line accessories.

1. Install the air line accessories as shown in FIG. 1. Verify that the air line supplying the accessories is grounded.
2. Install a conductive, flexible air line (A) between the accessories and the 3/4 npt(f) air inlet (N). Use a minimum 1/2 in. (13 mm) inner-diameter air line.

Fluid Supply and Outlet Lines

- **Fluid drain valve (J):** required in your system, relieves fluid pressure in the fluid line.
- **Fluid pressure relief valve (V):** relieves fluid pressure in the fluid line. See FIG. 5.
- **Fluid shutoff valve (K):** shuts off fluid flow.

1. Install flexible, conductive fluid lines (G and L).
2. Install a fluid drain valve (J) in the fluid outlet line (L) close to the fluid outlet. See FIG. 1.



A fluid drain valve (J) is required to relieve pressure in the fluid outlet line. The drain valve reduces the risk of serious injury, including splashing in the eyes or on the skin, when relieving pressure.

3. Install a fluid shutoff valve (K) in the fluid outlet line (L) downstream from the fluid drain valve (J).
4. If needed, install a fluid pressure relief valve (V). See **Fluid Pressure Relief Valve**, page 11.

NOTE: For best results, always install the pump as close as possible to the material source. See the **Technical Specifications**, page 32, for maximum suction lift (wet and dry).

NOTICE

The equipment can be damaged if flexible fluid lines are not used. If hard-plumbed fluid lines are used in the system, use a short length of flexible, conductive fluid line to connect to the equipment.



Tips to Reduce Cavitation

Cavitation in a diaphragm pump is the formation and collapse of bubbles in the pumped liquid. Frequent or excessive cavitation can cause serious damage, including pitting and early wear of fluid chambers, flappers, and seats. It may result in reduced efficiency of the pump. Cavitation damage and reduced efficiency both result in increased operating costs.

Cavitation depends on the vapor pressure of the pumped liquid, the system suction pressure, and the velocity pressure. It can be reduced by changing any of these factors.

1. Reduce vapor pressure: Decrease the temperature of the pumped liquid.
2. Increase suction pressure:
 - a. Lower the installed position of the pump relative to the liquid level in the supply.
 - b. Reduce the friction length of the suction lines. Remember that fittings add friction length to the

lines. Reduce the number of fittings to reduce the friction length.

- c. Increase the diameter of the suction lines.
 - d. Ensure the inlet fluid pressure does not exceed 25% of the outlet working pressure.
3. Reduce liquid velocity: Slow the cyclic rate of the pump.

Pumped liquid viscosity is also very important but normally is controlled by factors that are process dependent and cannot be changed to reduce cavitation. Viscous liquids are more difficult to pump and more prone to cavitation.

Graco recommends taking all of the above factors into account in system design. To maintain pump efficiency, supply only enough air to the pump to achieve the required flow.

Graco distributors can supply site-specific suggestions to improve pump performance and reduce operating costs.



Orientation of Fluid Inlet and Outlet Ports

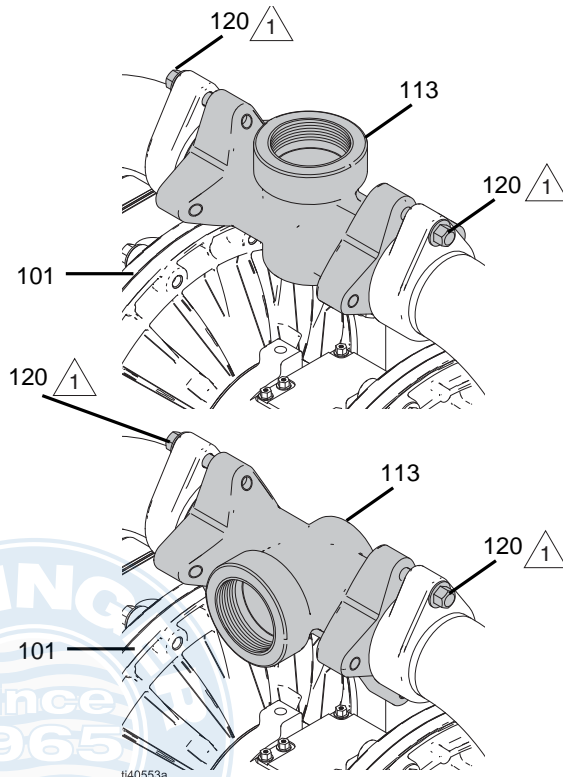
The fluid port of the center manifold can be rotated to either a vertical or horizontal position.

To change the fluid port orientation of the center manifold (113):

1. Remove the manifold screws (120).
2. Rotate the center manifold (113) to the applicable vertical or horizontal position.
3. Install the manifold screws (120) and torque to 50–60 in-lb (5.65–6.78 N•m). See **Torque Sequence**, page 29.

KEY:

- 101 Fluid covers
- 120 Screw
- 113 Center manifold



1 Apply medium-strength (blue) thread locker to the threads. Torque to 50–60 in-lb (5.65–6.78 N•m). See **Torque Sequence**, page 29.

FIG. 4: Fluid Inlet and Outlet Port Orientation

Fluid Pressure Relief Valve



Some systems may require installation of a pressure relief valve (V) at the pump outlet to prevent overpressurization and rupture of the pump or hose.

Thermal expansion of fluid in the outlet line can cause overpressurization. Thermal expansion can occur when using long fluid lines exposed to sunlight or ambient heat, or when pumping from a cool to a warm area (for example, from an underground tank).

Overpressurization also can occur if the pump is used to feed fluid to a piston pump, and the intake valve of the piston pump does not close, causing fluid to back up in the outlet line.

The pressure relief valve reduces the risk of serious injury, including splashing in the eyes or on the skin.

Fluid Pressure Relief Valve 112119 (stainless steel) is available (*purchase separately*).

KEY:

- R Fluid inlet port
- S Fluid outlet port
- V Pressure relief valve

- 1 Install valve between fluid inlet and outlet ports.
- 2 Connect fluid inlet line here.
- 3 Connect fluid outlet line here.

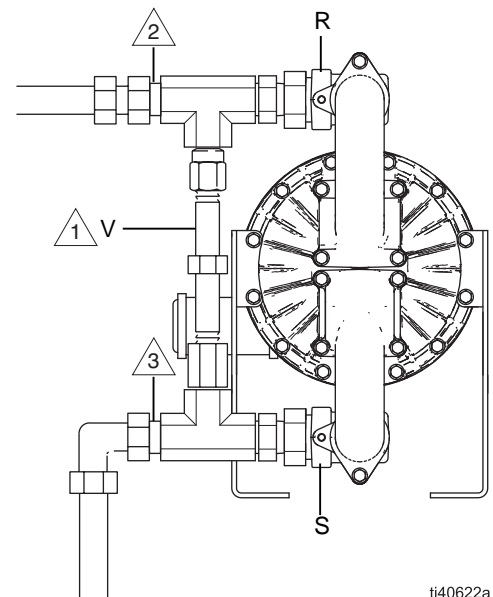


FIG. 5: Fluid Pressure Relief Valve

Operation

Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.



This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid, follow the **Pressure Relief Procedure** when you stop dispensing and before cleaning, checking, or servicing the equipment.

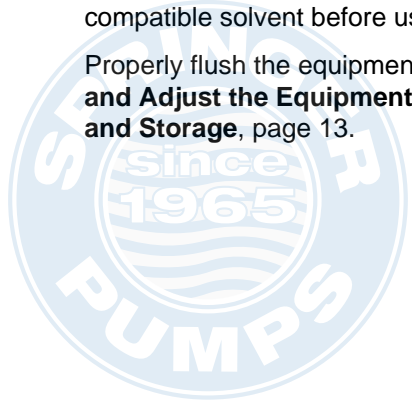
1. Close the bleed-type master air valve (B) to shut off the air to the equipment.
2. Open outbound fluid valve to relieve fluid pressure from the equipment.
 - a. **For simple transfer applications**, open either the fluid shutoff valve (K) or the fluid drain valve (J).
 - b. **For circulating applications**, ensure that the fluid shutoff valve (K) is closed and open the fluid drain valve (J).

Flush Before Using Equipment



NOTE: The equipment was tested with water. If water could contaminate your fluid, flush the equipment with a compatible solvent before using the equipment.

Properly flush the equipment before use. Perform **Start and Adjust the Equipment**, page 12, and **Flushing and Storage**, page 13.



Start and Adjust the Equipment

1. Confirm that the equipment is properly grounded. See **Grounding**, page 7.
2. Check and tighten all fasteners, air connections, and fluid connections before operating the equipment. Replace worn or damaged parts as needed.

NOTICE

Firmly tighten all fasteners and connections to avoid air or fluid leaks. To avoid equipment damage, do not over-torque the fasteners on the equipment. See **Torque Sequence**, page 29.

3. Connect a flexible, conductive fluid supply line (G) from the fluid to be pumped to the fluid inlet port (R).
4. Connect the flexible, conductive fluid outlet line (L) to the fluid outlet port (S) and route the line to the end container.
5. Close the fluid drain valve (J).
6. Turn the air regulator (C) to the lowest air pressure setting and open the bleed-type master air valve (B).
7. If the fluid outlet line (L) has a dispensing device, hold it open while continuing with the following step.
8. To prime the pump, slowly increase air pressure with the air regulator (C) until pump starts to cycle. Do not exceed the maximum operating air pressure listed in the **Technical Specifications**, page 32. Allow the pump to cycle slowly until all air is pushed out of the fluid lines and fluid exits the fluid outlet line (L).

Equipment Shutdown



At the end of each work shift, perform the **Pressure Relief Procedure**, page 12.

Flush the equipment if necessary. See **Flushing and Storage**, page 13.

Maintenance

Before Each Use

Before each use, check and torque all fasteners before operating the equipment. See **Torque Sequence**, page 29. Replace worn or damaged parts as needed.

NOTE: Be sure to use a compatible liquid thread sealant on all replaced male threads.

Check and tighten all air and fluid connections before operating the equipment. Replace worn or damaged parts as needed.

NOTICE

Firmly tighten all fasteners and connections to avoid air or fluid leaks. To avoid equipment damage, do not over-torque the fasteners on the equipment. See **Torque Sequence**, page 29.

Lubrication

The equipment is lubricated at the factory. It is designed to require no further lubrication for the life of the equipment. There is no need to add an inline lubricator under normal operating conditions.

The air valve is designed to operate unlubricated. If lubrication is desired, every 500 hours of operation (or monthly) remove the line from the equipment air inlet and add two drops of machine oil to the air inlet.

NOTICE

Do not over-lubricate the equipment. Lubricant is exhausted through the muffler and could contaminate your fluid supply or other equipment. Excessive lubrication can also cause the equipment to malfunction.

Flushing and Storage



To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.

- Flush before changing fluid materials, before fluid can dry or freeze in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check and tighten all fasteners and fluid connections. Replace worn or damaged parts as needed.
- Flush with a solvent that is compatible with the fluid being dispensed and the equipment wetted parts.
- Flushing schedule will vary based on particular uses.
- Always cycle the equipment during the entire flushing process.
- Always perform the **Pressure Relief Procedure**, page 12, and flush the equipment before storing it for any length of time.
 1. Perform the **Pressure Relief Procedure**, page 12.
 2. Insert the suction end of the supply line (G) into a compatible solvent.
 3. Open the air regulator (C) to supply low pressure air to the equipment.
 4. Run the equipment for enough time to thoroughly clean the equipment and lines.
 5. Close the air regulator (C).
 6. Remove the suction end of the supply line (G) from the compatible solvent and drain the equipment.

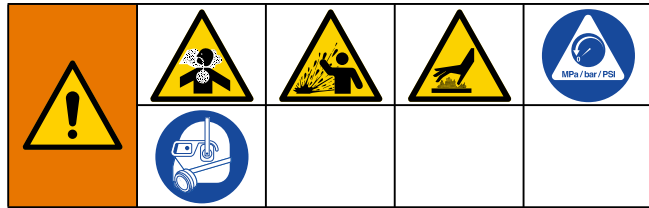
Recycling and Disposal

End of Product Life

At the end of the product's useful life, dismantle and recycle it in a responsible manner.

- Perform the **Pressure Relief Procedure**, page 12.
- Drain and dispose of fluids according to applicable regulations. Refer to the material manufacturer's Safety Data Sheet.
- Deliver remaining product to a recycling facility.

Troubleshooting



1. Follow **Pressure Relief Procedure**, page 12, before checking or repairing the equipment.
2. Check all possible problems and causes before disassembling equipment.

Problem	Cause	Solution
Equipment cycles at stall or fails to hold pressure at stall.	Worn check valve flappers (116), seats (115) or gaskets (112, 114).	Replace. See page 16.
Equipment will not cycle, or cycles once and stops.	Air valve is stuck or dirty.	Disassemble and clean air valve. See page 21. Use filtered air.
	Check valve flapper (116) is stuck.	Replace flapper and seat. See page 16.
	Check valve flapper (116) is stuck due to overpressurization.	Install Pressure Relief Valve. See page 11.
	Dispensing valve clogged.	Relieve pressure and clear valve.
Equipment cycles but will not prime or no flow.	Excessive suction lift.	Ensure the suction lift does not exceed the maximum listed in Technical Specifications , page 32. To aid with priming, fill the chambers with liquid.
Equipment operates erratically.	Clogged suction line.	Inspect; clear.
	Sticky or leaking check valve flapper (116).	Clean or replace. See page 16.
	Diaphragm ruptured.	Replace. See page 18.
	Restricted exhaust.	Remove restriction.
Air bubbles in fluid.	Supply line is loose.	Tighten.
	Diaphragm ruptured.	Replace. See page 18.
	Loose inlet manifold components, damaged gasket (121) between manifold components, or damaged check valve gaskets (112, 114).	Tighten manifold bolts (120) or replace seats (115) or gaskets (112, 114, or 121). See page 16.
	Loose diaphragm shaft bolt (107).	Tighten or replace. See page 18.
	Damaged o-ring (108).	Replace. See page 18.
Fluid in exhaust air.	Diaphragm ruptured.	Replace. See page 18.
	Loose diaphragm shaft bolt (107).	Tighten or replace. See page 18.
	Damaged o-ring (108).	Replace. See page 18.
Equipment exhausts excessive air at stall.	Worn air valve block (7), o-ring (6), plate (8), pilot block (18), u-cups (10), or pilot pin o-rings (17).	Repair or replace. See page 21.
	Worn shaft seals (402).	Replace. See page 18.

Problem	Cause	Solution
Equipment leaks air externally.	Air valve cover (2) or air valve cover screws (3) are loose.	Tighten screws. See page 21.
	Air valve gasket (4) or air cover gasket (22) is damaged.	Inspect; replace. See pages 18 to 21.
	Air cover screws (3) are loose.	Tighten screws. See page 21.
Equipment leaks fluid externally from flapper check valves.	Over-torqued center manifold bolts (120), causing the joint between the fluid cover (101) and manifolds (102, 103) to separate.	Loosen manifold center bolts (120).
	Or loose joint between manifolds (102, 103) and fluid cover (101).	Tighten manifold bolts (120), see Torque Sequence , page 29.
	Damaged gaskets (112, 114).	Retorque manifold center bolts (120). See Torque Sequence , page 29. Do not overtighten.
		Replace gaskets (112, 114), see page 16.



Repair

Repair kits available to purchase separately. Use all parts in the kits for best results. See **Parts**, starting on page 25.

Check Valve Repair

Tools Required:

- Torque wrench
- 10 mm socket wrench
- 15 mm socket wrench

See **Kits and Accessories**, page 28, for available repair kits. Service the check valves as follows. See FIG. 6.

Disassemble Check Valves



1. Perform the **Pressure Relief Procedure**, page 12.
2. Disconnect all air and fluid lines from the equipment.
3. Remove screws (120) from manifolds (102, 103). Remove manifolds from fluid covers (101).

NOTE: Use care while removing manifolds to avoid damage to check valve components.

4. Remove all check valve components and gaskets (121).

NOTE: Pay attention to the orientation of the check valve components for reassembly.

5. Clean and inspect all parts for wear or damage. Replace as needed.

NOTE: To ensure proper seating, always replace all seat and check valve components when performing check valve repairs.

Reassemble Check Valves

1. Install all check valve components in the correct orientation. See FIG. 6.

NOTE: Ensure that the check valves and seating areas are clean.

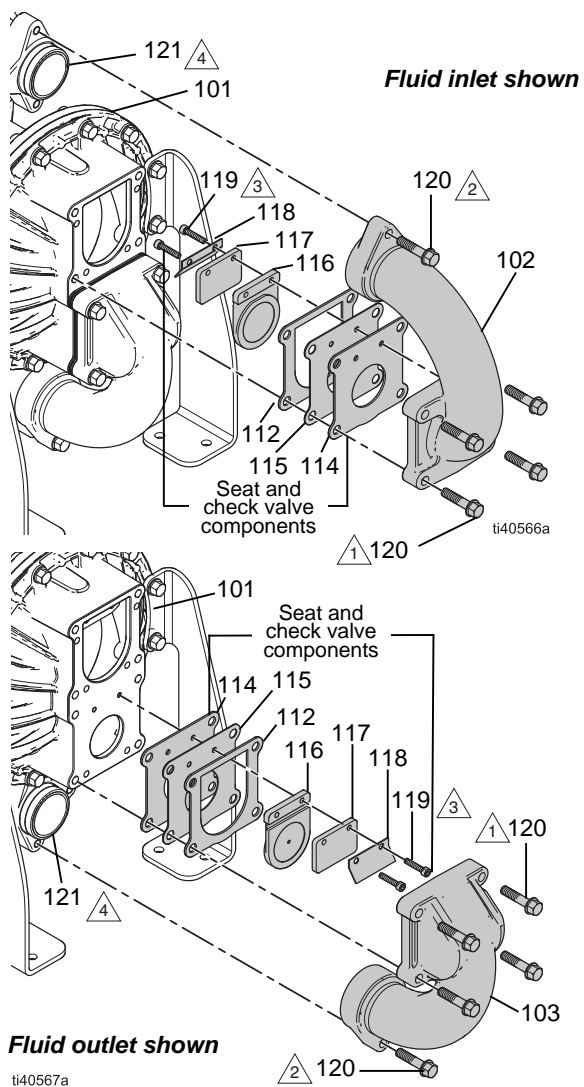
NOTE: Install the flapper valves with the solid rubber side facing toward the seat.

2. Install gaskets (121).

NOTE: Grease both surfaces of the gasket (121) before reassembling manifolds (102, 103).

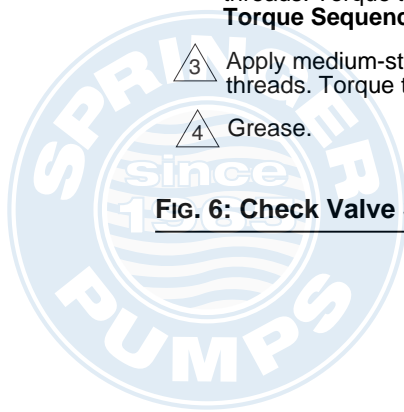
3. Align manifolds (102, 103) with fluid covers (101).
4. Insert screws (120) and torque. See **Torque Sequence**, page 29.
5. Reconnect air and fluid lines to equipment.





- 1 Apply medium-strength (blue) thread locker to the threads. Torque to 190–220 in-lb (21.5–24.9 N•m). See **Torque Sequence**, page 29.
- 2 Apply medium-strength (blue) thread locker to the threads. Torque to 120–130 in-lb (13–14 N•m). See **Torque Sequence**, page 29.
- 3 Apply medium-strength (blue) thread locker to the threads. Torque to 20–25 in-lb (2.26–2.82 N•m).
- 4 Grease.

FIG. 6: Check Valve Section



Diaphragm Repair

Tools Required:

- Torque wrench
- 10 mm socket wrench
- 15 mm socket wrench
- 19 mm open-end wrench
- O-ring pick
- Lithium-base grease, part no. 111920 (Lubriplate 630AA or equivalent)

Service the diaphragms as follows.
See FIG. 7–FIG. 9.

Disassemble Diaphragms



1. Perform the **Pressure Relief Procedure**, page 12.
2. Disconnect all air and fluid lines from the equipment.
3. Perform **Disassemble Check Valves**, page 16.
4. Remove screws (106, 120) from fluid covers (101). Remove fluid covers from air covers (23).
5. Use an applicable wrench to loosen the diaphragm shaft bolts (107). Do not remove bolt.
6. Remove one diaphragm assembly (401). See FIG. 9.
7. Remove the other diaphragm assembly (401) with the shaft (24).
8. Disassemble the diaphragm plates (104, 105), diaphragms (401), packing o-rings (108), and bolt (107).
9. Clean and inspect all parts for wear or damage. Replace as needed.

Reassemble Diaphragms

1. Assemble the diaphragm plates (104, 105), packing o-ring (108), and diaphragm (401) onto the diaphragm shaft bolt (107). See FIG. 9.

NOTE: Install diaphragms (401) with the side marked AIR SIDE facing toward the center housing (1). See FIG. 8.

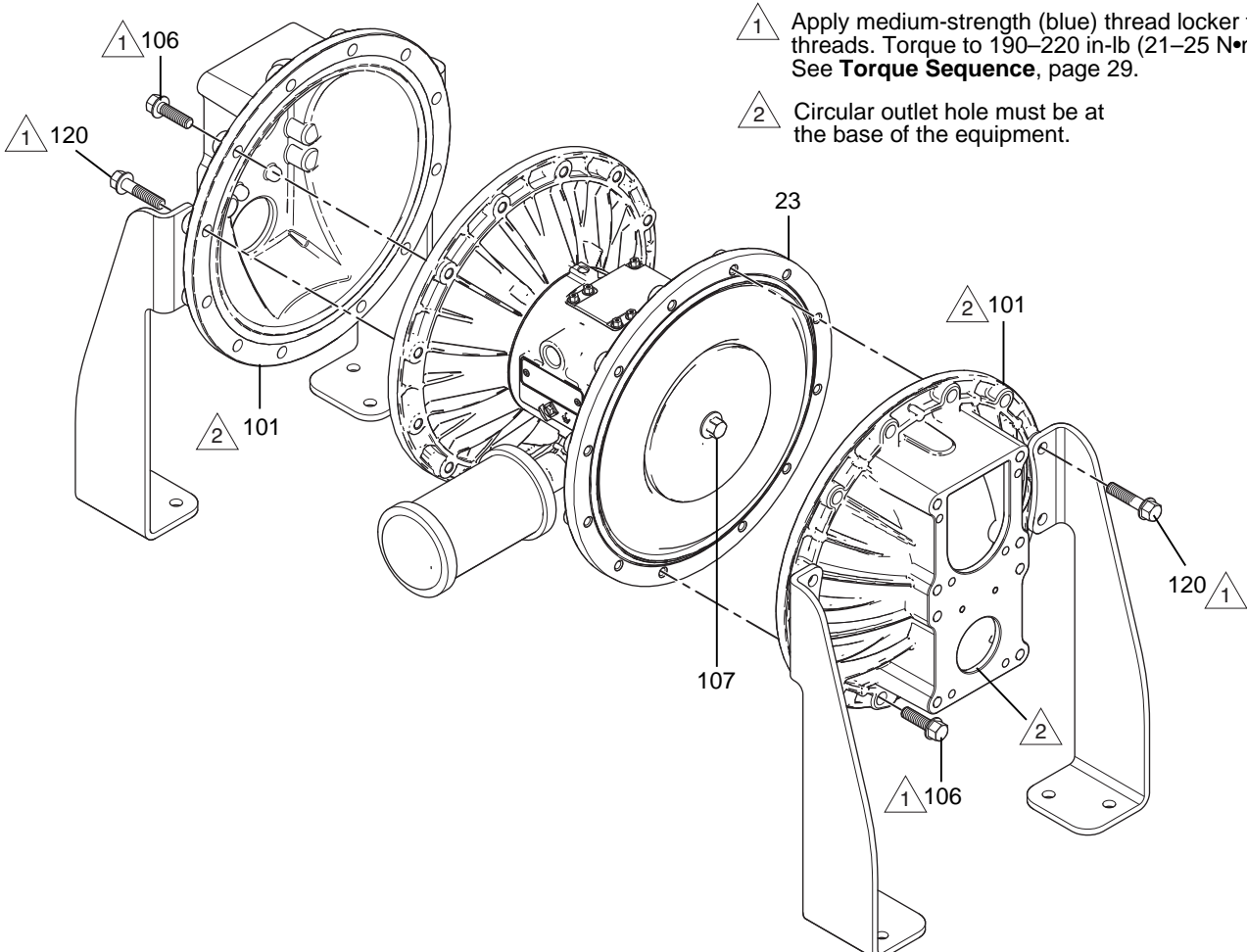
2. Screw the diaphragm assembly onto one side of the shaft (24). Torque to 28–33 in-lb (3.2–3.7 N•m).
3. Grease the length of the shaft (24) and slide through the center housing (1).
4. Repeat steps 1–2 for the other diaphragm assembly.
5. Apply medium-strength (blue) thread locker to the threads of the fluid cover screws (106, 120).

NOTICE

After reassembly, allow the thread locker to cure for 12 hours, or per manufacturer's instructions, prior to operating the equipment. Damage to the equipment will occur if the diaphragm shaft bolt loosens.

6. Align fluid covers (101) with center housing (1) and insert fluid cover screws (106, 120). Torque to 40–45 ft-lb (54.2–61 N•m) at 100 rpm maximum. See **Torque Sequence**, page 29.
7. Perform **Reassemble Check Valves**, page 16.
8. Reconnect air and fluid lines to equipment.





- 1 Apply medium-strength (blue) thread locker to the threads. Torque to 190–220 in-lb (21–25 N•m). See **Torque Sequence**, page 29.
- 2 Circular outlet hole must be at the base of the equipment.

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FIG. 7: Diaphragm Section



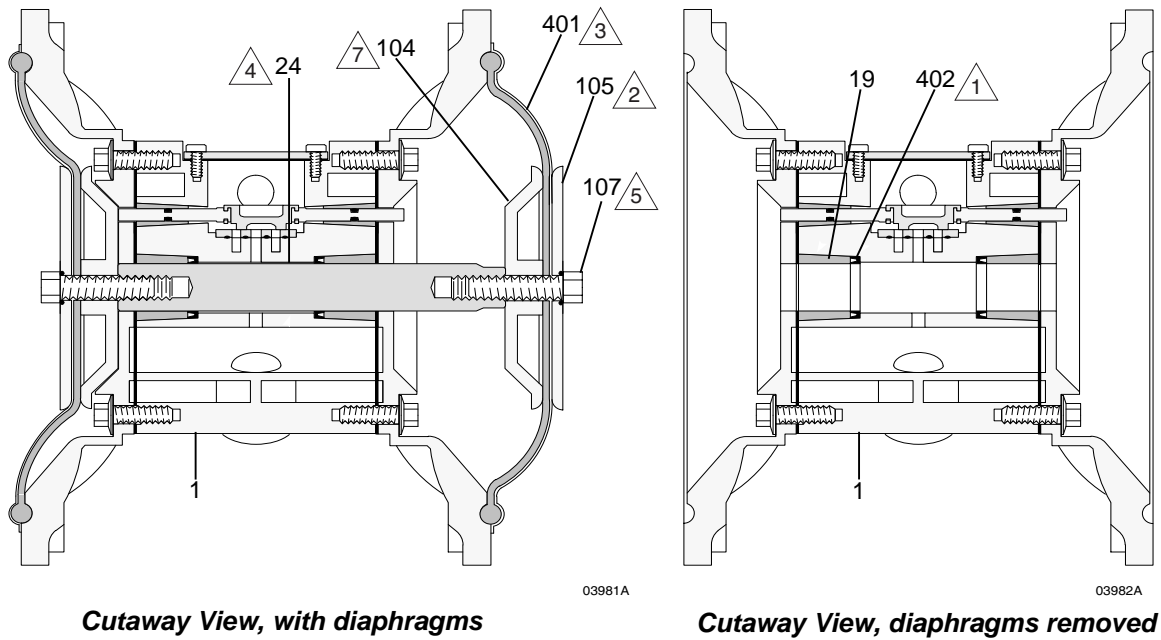
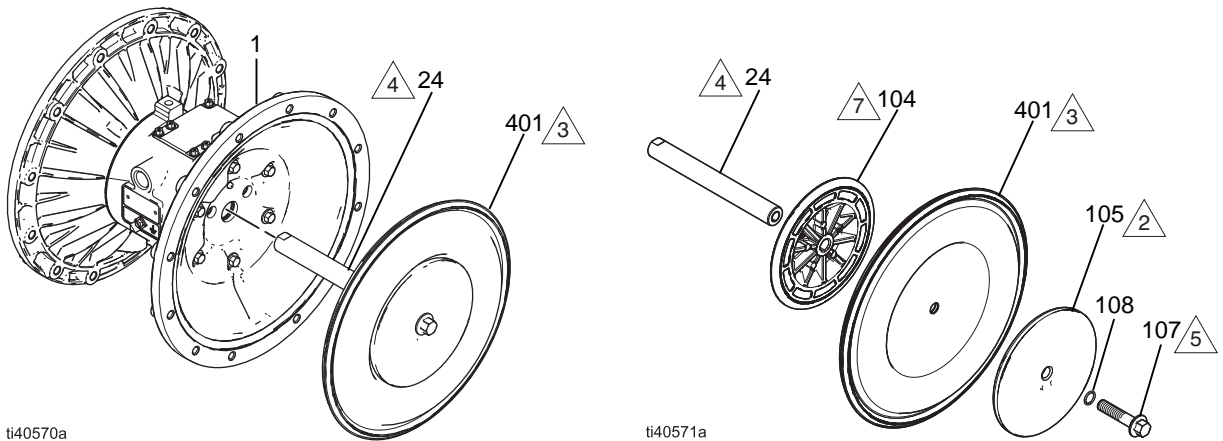


FIG. 8: Diaphragm Section, Cutaway Views



- ▲ 1 Lips face out of housing (1).
- ▲ 2 Rounded side faces diaphragm (401).
- ▲ 3 AIR SIDE must face center housing (1).
- ▲ 4 Grease.
- ▲ 5 Apply medium-strength (blue) thread locker. Torque to 40–45 ft-lb (54.2–61 N•m) at 100 rpm maximum.
- ▲ 7 Recessed side faces diaphragm (401).

FIG. 9: Diaphragm Section, Shaft Assembly

Air Valve Repair

Tools Required:

- Torque wrench
- Torx (T20) screwdriver or 7 mm (9/32 in.) socket wrench
- Needle-nose pliers
- O-ring pick
- Lithium-base grease, part no. 111920 (Lubriplate 630AA or equivalent)

Air valve repair kit 236273 is available. Use all parts in the kit for best results. See **Parts**, starting on page 25.

Service the air valve as follows. See FIG. 10–FIG. 13.

Disassemble Air Valve

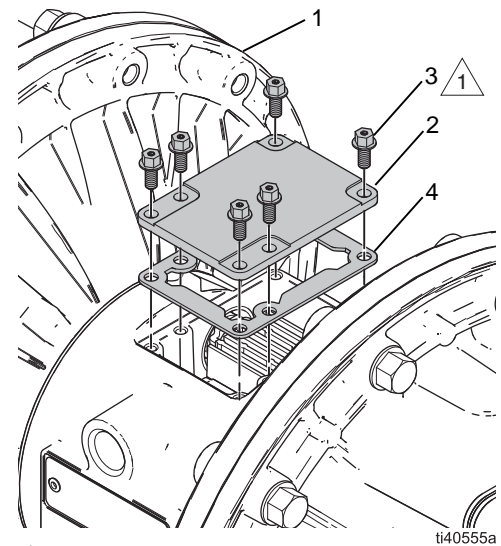


1. Perform the **Pressure Relief Procedure**, page 12.
2. Disconnect all air and fluid lines from the equipment.
3. Use an applicable screwdriver or wrench to remove the screws (3) from the valve cover (2) on the center housing (1). Remove valve cover (2) and gasket (4) from center housing (1).
4. Move the valve carriage (5) to the center position and pull it out of the cavity.
5. Remove the valve block (7) and o-ring (6) from the carriage.
6. Use a needle-nose pliers to pull the pilot block (18) straight up and out of the cavity. See FIG. 11.
7. Pull the actuator pistons (11) out of the bearings (12). See FIG. 12.
8. Remove the u-cup packings (10) from the pistons. Pull the pilot pins (16) out of the bearings (15).
9. Remove the o-rings (17) from the pilot pins.
10. Inspect the valve plate (8). If damaged, use an applicable screwdriver or wrench to remove the screws (3). Remove the valve plate (8) and seal (9). See FIG. 13.

11. Inspect the bearings (12, 15). If damaged, follow **Replace Bearing and Air Gasket**, page 23.

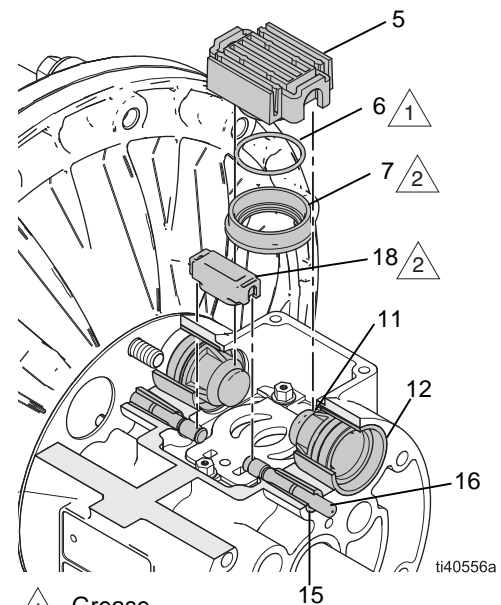
NOTE: Do not remove undamaged bearings.

12. Clean and inspect all parts for wear or damage. Replace as needed.



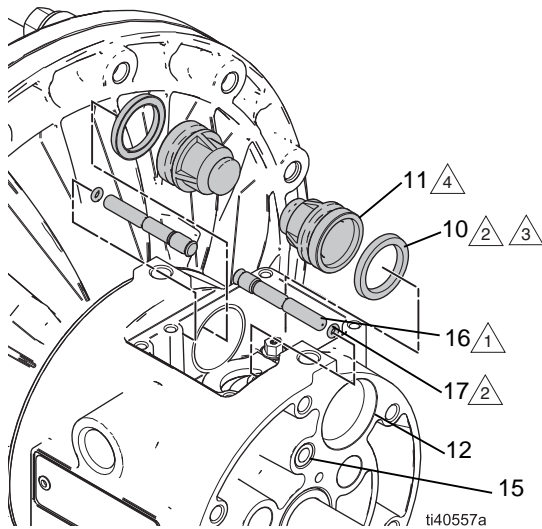
1 Torque to 50–60 in-lb (5.6–6.8 N•m).

FIG. 10: Air Valve Access



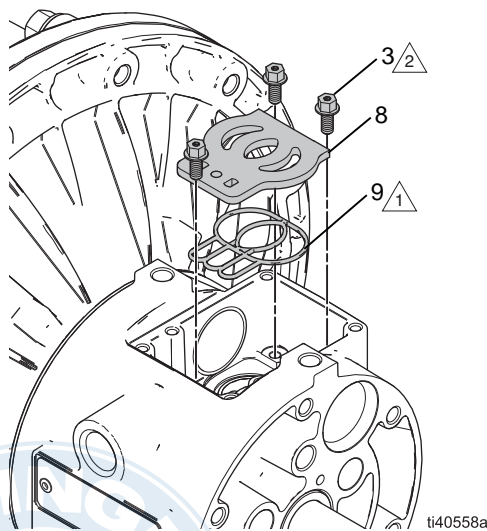
1 Grease.
2 Grease lower face.

FIG. 11: Air Valve Carriage



- 1 Insert narrow end first.
- 2 Grease.
- 3 Lips face narrow end of piston (11).
- 4 Insert wide end first.

FIG. 12: Air Valve Pistons



- 1 Rounded side must face down.
- 2 Tighten until bottoms out on housing.

FIG. 13: Air Valve Plate

Reassemble Air Valve

1. If bearings (12, 15) were removed, install new bearings. See **Replace Bearing and Air Gasket**, page 23.
2. Install the valve plate seal (9) into the groove at the bottom of the valve cavity. Ensure the rounded side of the seal faces down into the groove. See FIG. 13.
3. Install the valve plate (8) in the cavity. The plate is reversible, so either side can face up.
4. Use an applicable screwdriver or wrench to install the screws (3). Tighten until the screws bottom out on the housing. See Fig. 9.
5. Install an o-ring (17) on each pilot pin (16). Grease the pins and o-rings.
6. Insert the pilot pins (16) into the bearings (15), narrow end first. See FIG. 12.
7. Install a u-cup packing (10) on each actuator piston (11). Ensure the lips of the packings face the narrow end of the pistons. See FIG. 12.
8. Lubricate the u-cup packings (10) and actuator pistons (11). Reach inside the cavity and insert the actuator pistons into the bearings (12), wide end first. Leave the narrow end of the pistons exposed. See FIG. 12.
9. Grease the lower face of the pilot block (18) and install so its tabs snap into the grooves on the ends of the pilot pins (16). See FIG. 11.
10. Grease the o-ring (6) and install it in the valve block (7). See FIG. 11.
11. Push the valve block (7) onto the valve carriage (5). Grease the lower face of the valve block. See FIG. 11.
12. Install the valve carriage (5) so its tabs slip into the grooves on the narrow end of the actuator pistons (11). See FIG. 11.
13. Align the valve gasket (4) and cover (2) with the center housing (1) holes.
14. Insert screws (3). Torque to 50–60 in-lb (5.6–6.8 N•m). See FIG. 10.
15. Reconnect equipment to air and fluid lines.

Replace Bearing and Air Gasket

Tools Required:

- Torque wrench
- 10 mm socket wrench
- Bearing puller
- O-ring pick
- Press, or block and mallet

Service the bearing and air gasket as follows. See FIG. 14–FIG. 15.

Disassemble Bearing and Air Gasket



NOTE: Do not remove undamaged bearings.

1. Perform the **Pressure Relief Procedure**, page 12.
2. Remove the manifolds and disassemble the check valves. See **Check Valve Repair**, page 16.
3. Remove the fluid covers and diaphragm assemblies. See **Diaphragm Repair**, page 18.
4. If necessary, disassemble the air valves. See **Air Valve Repair**, page 21.

NOTE: It is not necessary to remove the air valves if only removing the diaphragm shaft bearing (19).

5. Use an applicable wrench to remove the screws (25) holding the air covers (23) to the center housing (1).
6. Remove the air cover gaskets (22). Always replace with new gaskets.
7. Use a bearing puller to remove the diaphragm shaft bearings (19), air valve bearings (12) or pilot pin bearings (15). Do not remove undamaged bearings.
8. If the diaphragm shaft bearings (19) were removed, reach into the center housing (1) with an o-ring pick to hook the u-cup packings (402). Remove u-cup packings from the housing.
9. Inspect parts for wear or damage. Replace as necessary.

Reassembly

1. If removed, install the shaft u-cup packings (402). Ensure the lips face out of the housing (1).
2. The bearings (19, 12, and 15) are tapered and can only be installed one way. Insert the bearings into the center housing (1), tapered end first. Use a press or a block and rubber mallet to press-fit the bearing. Ensure the bearing is flush with the surface of the center housing.
3. If necessary, reassemble the air valve. See **Reassemble Air Valve**, page 22.
4. Align the new air cover gasket (22) on the pilot pin (16) protruding from the center housing (1). Ensure the pin fits through the proper hole (H) in the gasket.
5. Align the air cover (23) so the pilot pin (16) fits in the middle hole (M) of the three small holes near the center of the cover. Install the screws (25) and hand-tighten.
6. Use an applicable wrench to torque the screws (25) to 120–150 in-lb (14–17 N•m).
7. Install the diaphragm assemblies and fluid covers. See **Reassemble Diaphragms**, page 18.
8. Reassemble the check valves and manifolds. See **Reassemble Check Valves**, page 16.

Repair

- 1 Insert bearings tapered end first.
- 2 Press-fit bearings flush with surface of center housing (1)
- 3 Apply medium-strength (blue) thread locker to the threads. Torque to 120–150 in-lb (14–17 N•m).

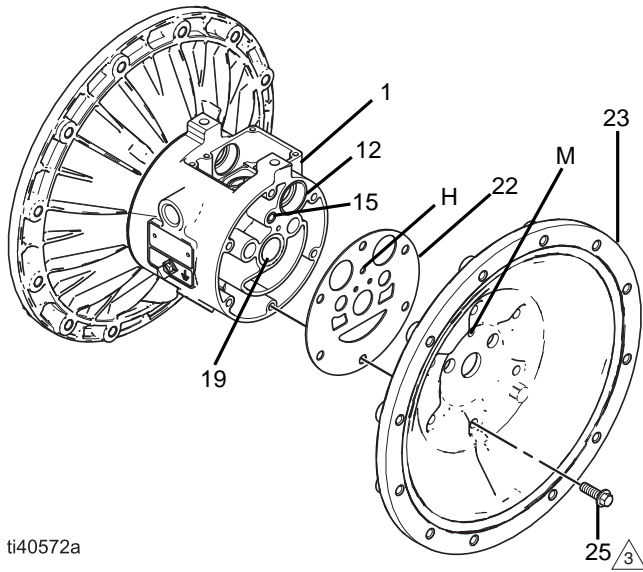


FIG. 14: Bearing and Air Gasket

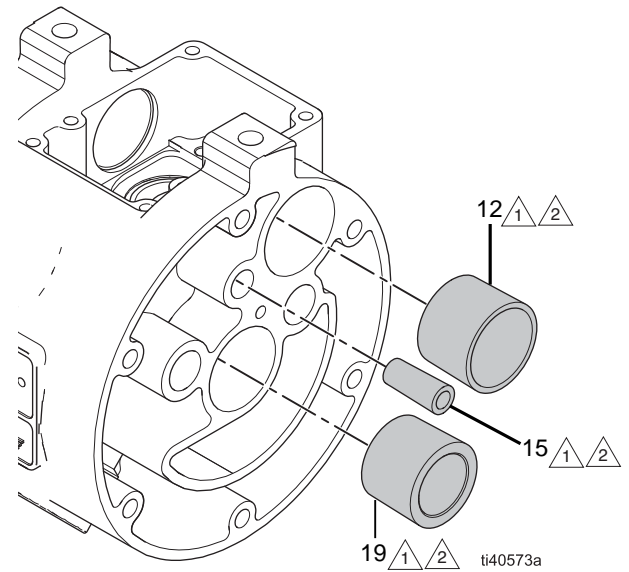
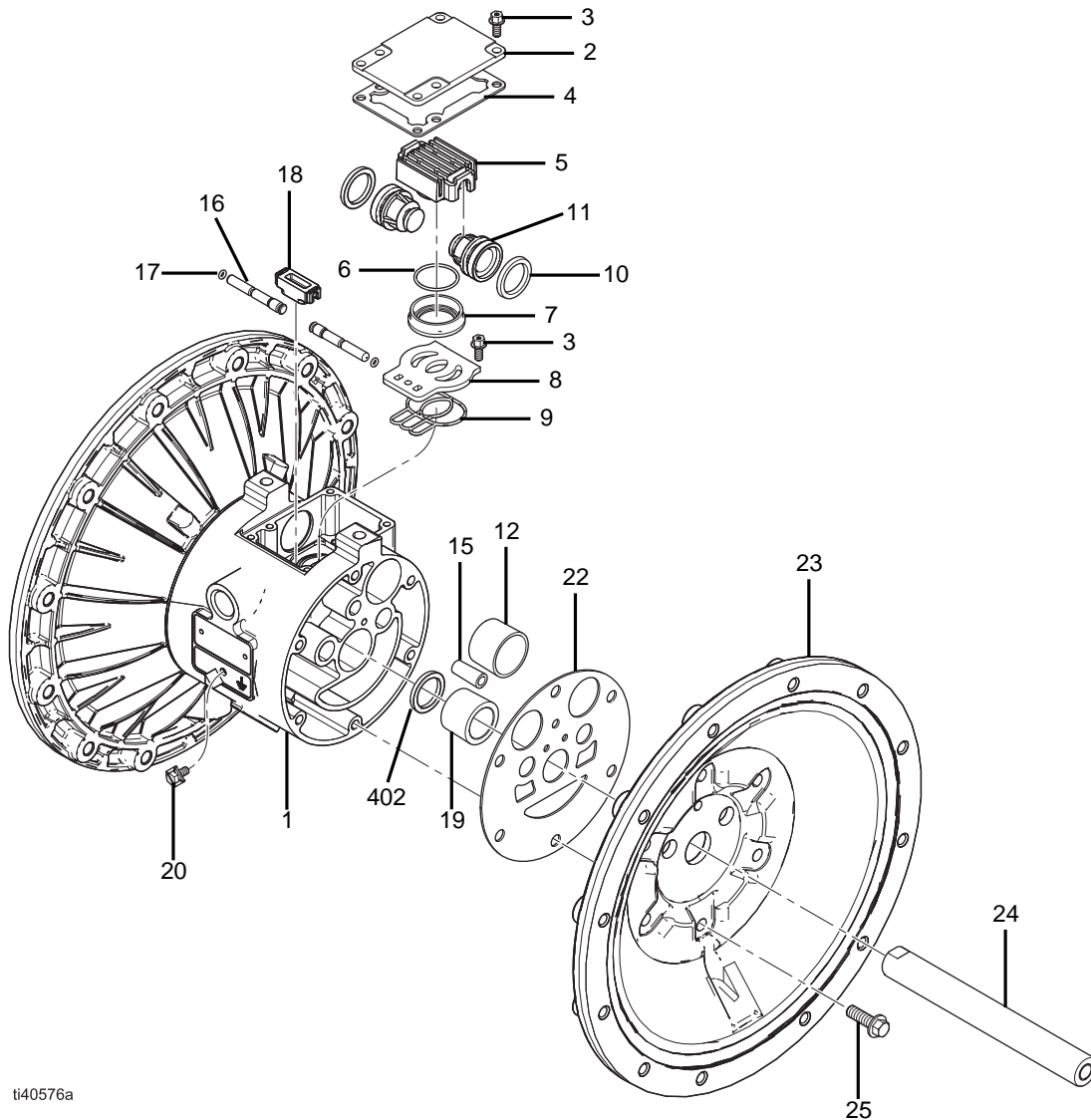


FIG. 15: Detail of Air Valve Bearings



Parts

Air Section Parts



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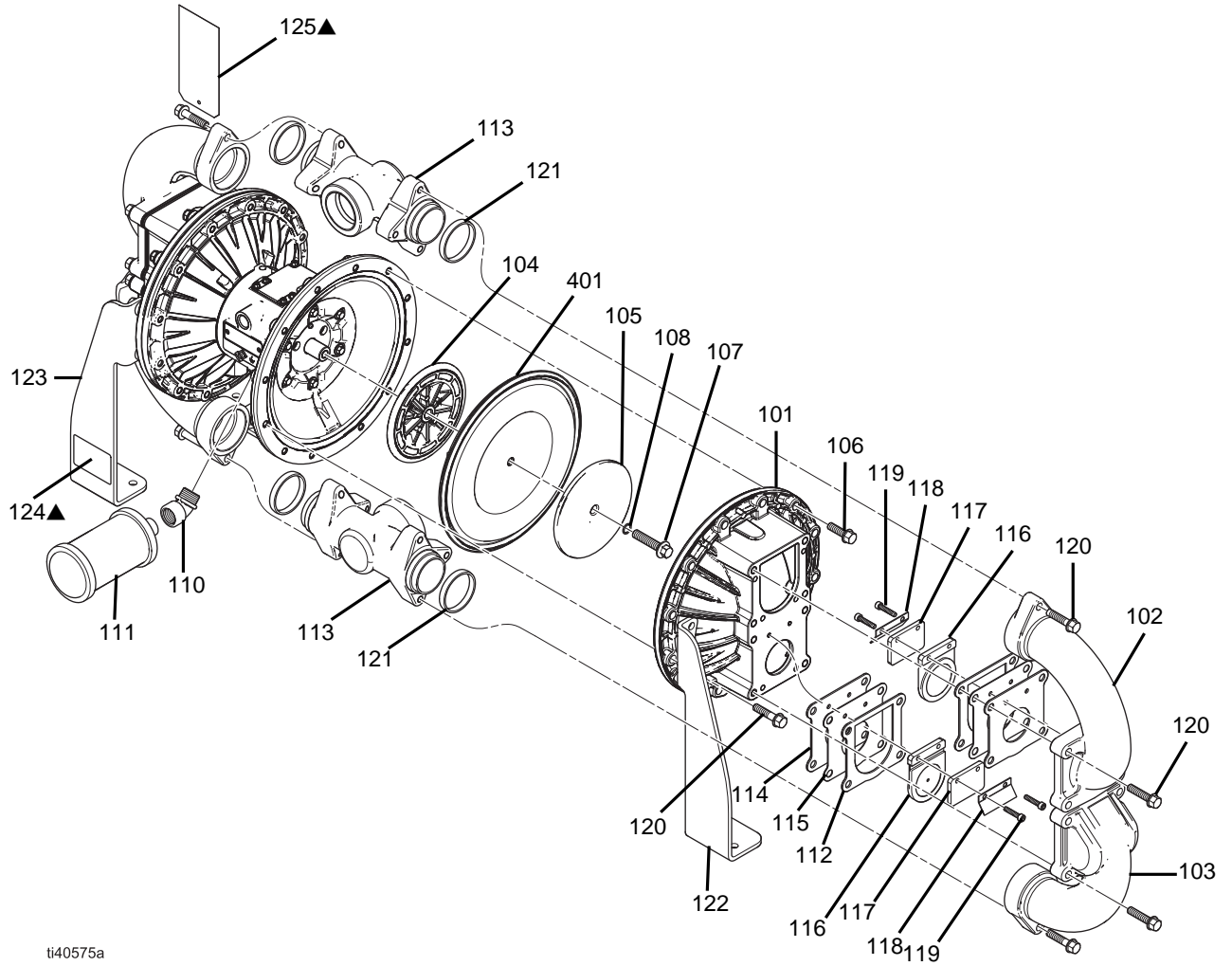
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Website: www.springerpumps.com
Int'l: +001 267 404 2910

Fluid Section Parts



ti40575a



Air Section Parts List

Ref.	Part No.	Description	Qty.
1	188838	HOUSING, center;	1
2	188854	COVER, air valve; alum.	1
3	116344	SCREW, mach, hex flange hd; M5 x 0.8; 12 mm	9
4†	---	GASKET, cover; santoprene	1
5	188855	CARRIAGE; aluminum	1
6†	---	O-RING; nitrile	1
7†	---	BLOCK, air valve; acetal	1
8	188615	PLATE, air valve; sst	1
9†	---	SEAL, valve plate; Buna-N	1
10†	---	PACKING, u-cup; nitrile	2
11	188612	PISTON, actuator; acetal	2
12	188613	BEARING, piston; acetal	2
15	188611	BEARING, pin; acetal	2
16	188610	PIN, pilot; stainless steel	2
17†	---	O-RING; Buna-N	2
18†	---	BLOCK, pilot; acetal	1
19	188609	BEARING, shaft; acetal	2
20	116343	SCREW, grounding	1
22	188603	GASKET, air cover; foam	2
23	189300	COVER, air; aluminum	2
24	189304	SHAFT, diaphragm; sst	1
402	112181	PACKING, u-cup	2

† Included in Air Valve Repair Kit 236273 (purchase separately).

--- Not available separately. See **Kits and Accessories**, page 28.

Fluid Section Parts List

Ref.	Part/Kit	Description	Qty.
101	20A298	COVER, fluid; aluminum	2
102	20A296	MANIFOLD, inlet; aluminum	1
103	20A297	MANIFOLD, outlet; aluminum	1
104	189298	PLATE, air side; aluminum	2
105	189820	PLATE, fluid side; carbon steel	2
106	25U701	SCREW; M10 x 1.50; 35 mm; <i>kit includes 16 screws</i>	16
107	189410	BOLT; M12 x 1.75; 55 mm; 316 stainless steel	2
108	---	O-RING; PTFE; <i>see page 28</i>	2
110	113778	ELBOW, conduit, 45 degrees	1
111	102656	MUFFLER	1
112	---	GASKET; <i>see page 28</i>	4
113		MANIFOLD, center	2
	20A301	npt	
	20A815	bspt	
114	---	GASKET; <i>see page 28</i>	4
115	---	SEAT, flapper; <i>see page 28</i>	4
116	---	VALVE, flapper; <i>see page 28</i>	4
117	---	SPACER, flapper; <i>see page 28</i>	4
118	---	BRACKET, flapper; <i>see page 28</i>	4
119	---	SCREW, cap, socket head; M6 x 1.0; 30 mm; <i>see page 28</i>	8
120	25U703	SCREW, hex washer head; M10 x 1.50; 45 mm; <i>kit includes 28 screws</i>	28
121	25U699	GASKET; <i>kit includes 4 gaskets</i>	4
122	---	BRACKET, mounting; <i>see page 28</i>	2
123	---	BRACKET, mounting; <i>see page 28</i>	2
124▲	188621	LABEL, safety, warning	1
125▲	18F457	TAG, retorque	1
401*	---	DIAPHRAGM; <i>see page 28</i>	2

▲ Replacement safety labels, tags, and cards are available at no cost.

--- Not available separately. See **Kits and Accessories**, page 28.



Kits and Accessories

To define material codes and reference numbers, see **Configuration Number Matrix**, page 5, and **Parts**, starting on page 25.

Seat Kits

Material	Kit No.	Includes Refs.	Description	Qty.
FB	25U695	112	GASKET	4
		114	GASKET	4
		115	SEAT, flapper	4

Gasket Kits

Material	Kit No.	Includes Refs.	Description	Qty.
BN	25U699	121	GASKET	4

Check Valve Kits

Material	Kit No.	Includes Refs.	Description	Qty.
-B	25U696	116	VALVE, flapper	4
		117	SPACER, flapper	4

Check Valve Bracket Kits

Kit No.	Includes Refs.	Description	Qty.
25U702	118	BRACKET, flapper	4
	119	SCREW, cap, socket head; M6 x 1.0; 30 mm	8

Mounting Kits

Kit No.	Includes Refs.	Description	Qty.
25U704	122	BRACKET, mounting	2
	123	BRACKET, mounting	2

Diaphragm Kits

Material	Kit No.	Includes Refs.	Description	Qty.
TP	D0F005	401	DIAPHRAGM-H1 TP	2
		108	O-RING; PTFE	2
SP	D0F006	401	DIAPHRAGM-H1 SP	2
		108	O-RING; PTFE	2
BN	D0F007	401	DIAPHRAGM-H1 BN	2
		108	O-RING; PTFE	2
GE	D0F00G	401	DIAPHRAGM-H1 GE	2
		108	O-RING; PTFE	2
CR	25U697	401	DIAPHRAGM-H1 CR	2
		108	O-RING; PTFE	2

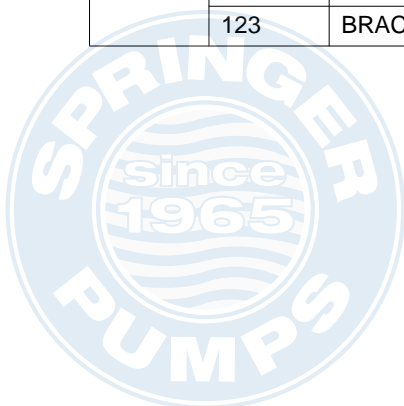
Fluid Section Repair Kits

Kit descriptions appear in the following order: *Pump model, seat material, check material, diaphragm material, gasket material*. For example, 2150LP FB,-B,BN,BN.

Kit No.	Description
25U690	2150LP FB,-B,BN,BN
25U691	2150LP FB,-B,CR,BN
25U692	2150LP FB,-B,GE,BN
25U693	2150LP FB,-B,SP,BN
25U694	2150LP FB,-B,TP,BN

Kits include:

- 4 seats (115)
- 4 gaskets (112)
- 4 gaskets (114)
- 4 flapper valves (116)
- 4 spacers (117)
- 2 diaphragms (401)
- 2 packing o-rings (108)
- 4 gaskets (121)
- 1 packet anaerobic adhesive



Torque Instructions

To ensure proper sealing, torque fasteners using the following procedure.

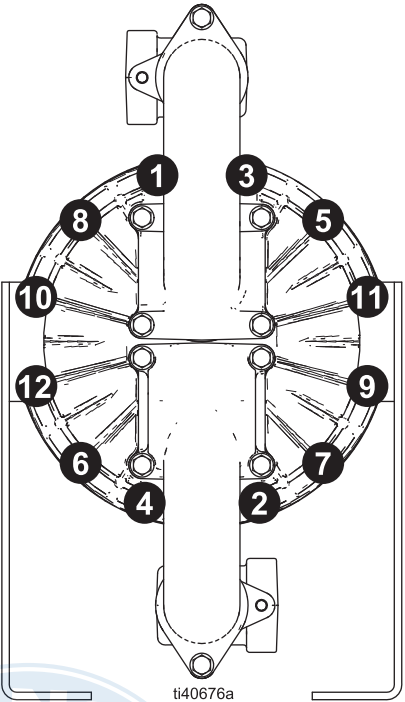
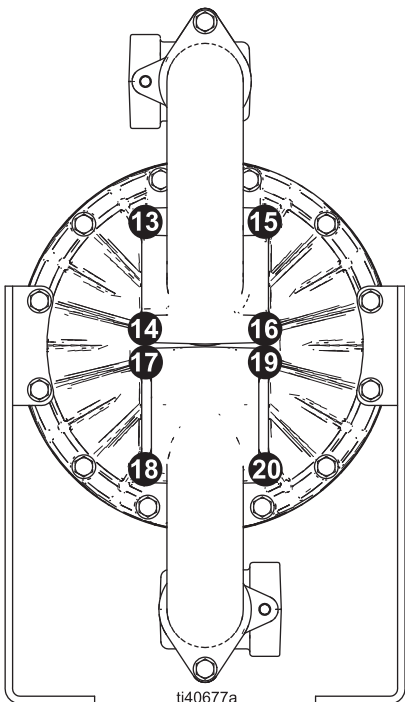
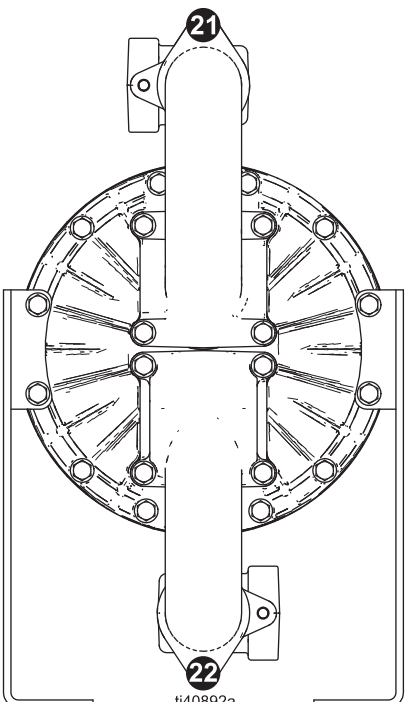
NOTE: Always completely torque fluid covers before torquing manifolds.

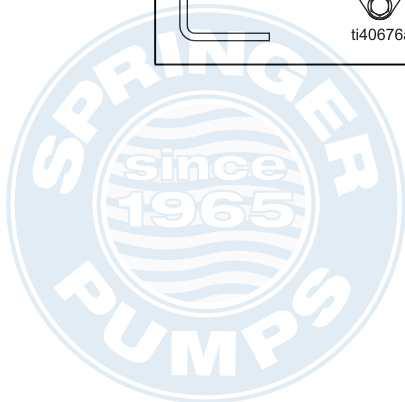
1. Start all fasteners a few turns.

2. Follow the torque sequence to turn down each fastener until the fastener head contacts the equipment.
3. Follow the torque sequence to turn each screw by 1/2 turn or less until at specified torque.

Torque Sequence

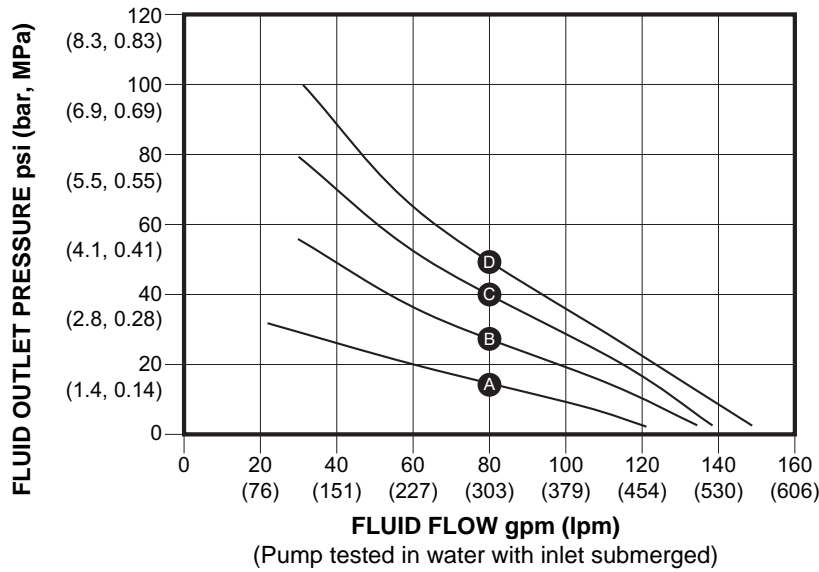
For proper installation, always follow the torque sequence whenever instructed to torque fasteners.

Fluid Covers	Manifolds	Center Manifolds
Torque to 190–220 in-lb (21–25 N•m)	Torque to 190–220 in-lb (21–25 N•m)	Torque to 50–60 in-lb (5.65–6.78 N•m)
 <p>ti40676a</p>	 <p>ti40677a</p>	 <p>ti40892a</p>



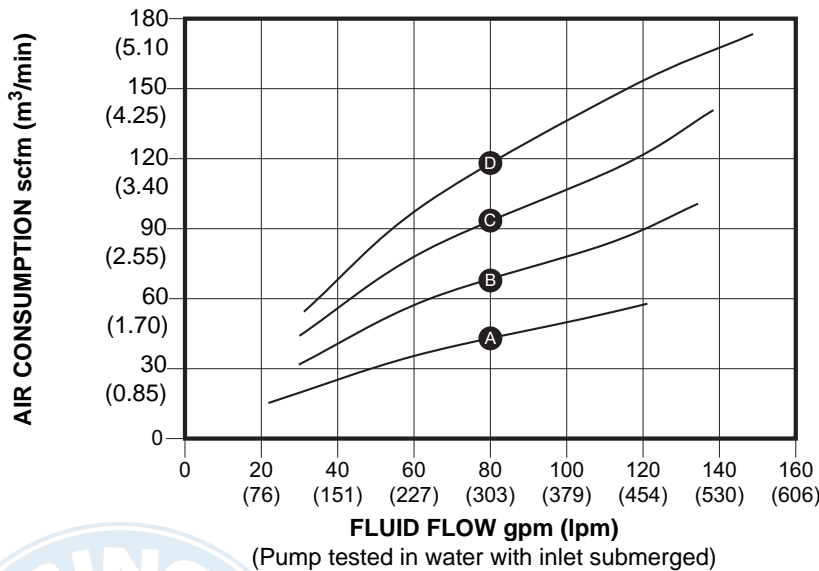
Performance Charts

Pressure Chart



- OPERATING AIR PRESSURE**
- A** 40 psi air (2.8 bar, 0.28 MPa)
 - B** 70 psi air (4.8 bar, 0.48 MPa)
 - C** 100 psi air (7 bar, 0.7 MPa)
 - D** 120 psi air (8.62 bar, 0.86 MPa)

Flow Chart



- OPERATING AIR PRESSURE**
- A** 40 psi air (2.8 bar, 0.28 MPa)
 - B** 70 psi air (4.8 bar, 0.48 MPa)
 - C** 100 psi air (7 bar, 0.7 MPa)
 - D** 120 psi air (8.62 bar, 0.86 MPa)

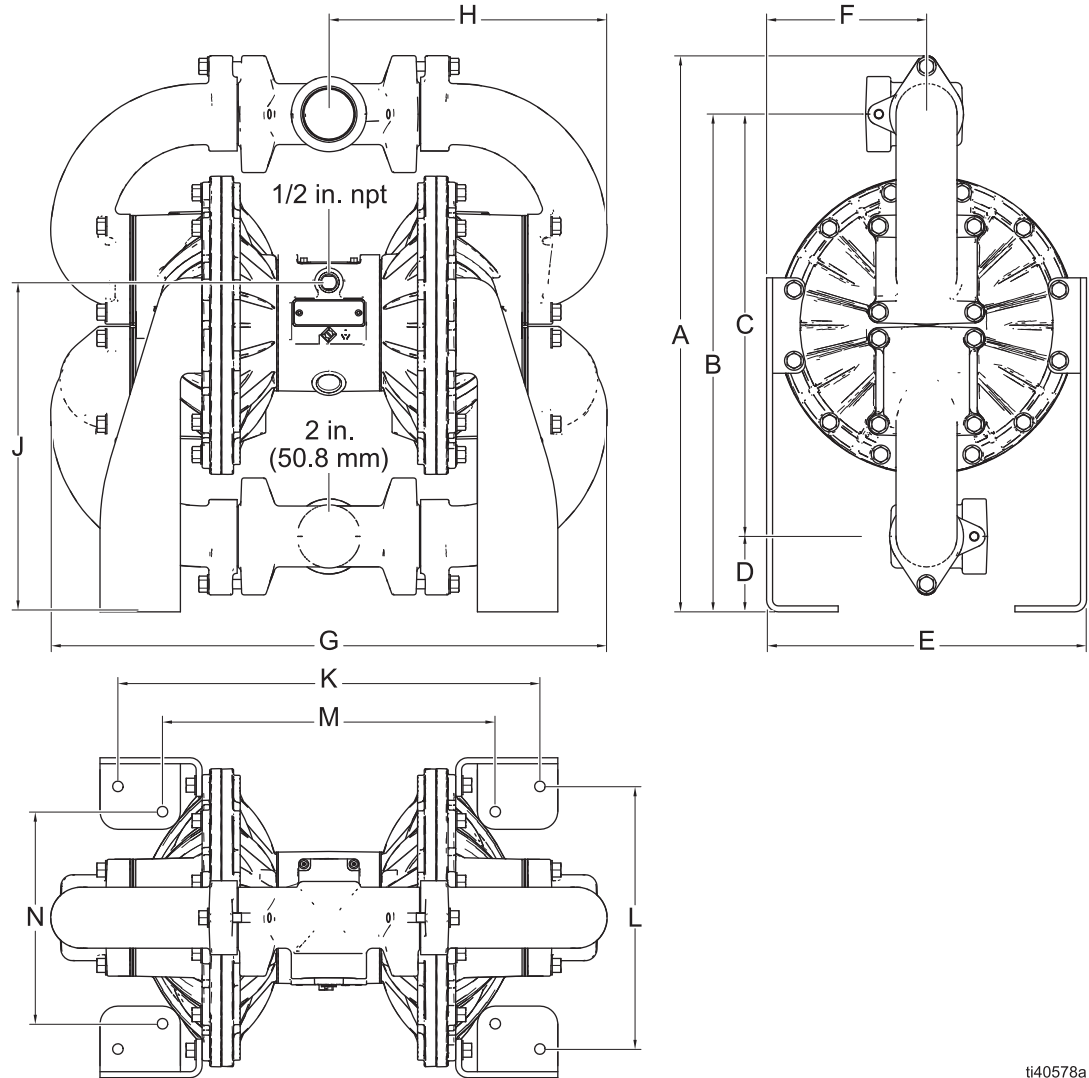
To find Fluid Outlet Pressure (psi/bar/MPa) at a specific fluid flow (gpm/lpm) and operating air pressure (psi/bar/MPa):

1. Locate fluid flow rate along bottom of chart.
2. Follow vertical line up to intersection with selected operating air pressure curve.
3. Follow left to scale to read fluid outlet pressure.

To find Air Consumption (scfm or m³/min) at a specific fluid flow (gpm/lpm) and air pressure (psi/bar/MPa):

1. Locate fluid flow rate along bottom of chart.
2. Read vertical line up to intersection with selected operating air pressure curve.
3. Follow left to scale to read air consumption.

Dimensions

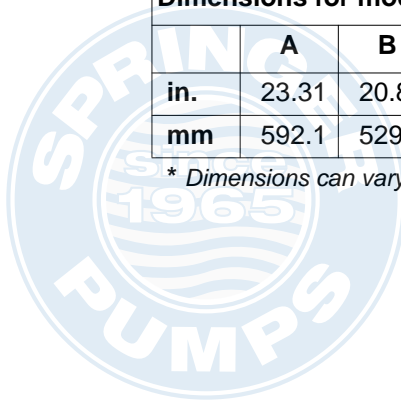


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Dimensions for models with Aluminum Center and Aluminum Cover

	A	B	C	D	E	F	G*	H*	J	K*	L	M*	N
in.	23.31	20.86	17.73	3.16	13.40	6.70	23.29	11.64	13.81	17.69	11.01	13.95	8.89
mm	592.1	529.8	450.3	80.3	340.4	170.2	591.6	295.7	350.8	449.3	279.7	354.3	225.8

* Dimensions can vary by up to 1/4 in. (6.3 mm) depending on the diaphragm material fitted in the equipment.



Technical Specifications

Husky 2150 LP Air-Operated Diaphragm Pumps		
	US	Metric
Maximum fluid working pressure	120 psi	0.83 MPa, 8.27 bar
Air pressure operating range*	20–120 psi	0.14–0.83 MPa, 1.38–8.27 bar
Maximum air consumption	175 scfm	4.95 m ³ /minute
Air consumption at 70 psi/60 gpm	60 scfm	1.7 m ³ /minute
Maximum free-flow delivery	150 gpm	568 lpm
Maximum pump speed	145 cycles per minute	
Maximum size pumpable solids	1.8 in.	46 mm
Environmental temperature range	–4° to 140°F	–20° to 60°C
Maximum suction lift		
Dry	20 ft	6.10 meters
Wet	30 ft	9.14 meters
Fluid flow per cycle*		
Standard Diaphragms	1 gallon	3.79 liters
Noise (dBa)‡		
Maximum sound pressure	90 dBa at 100 psi (0.69 MPa, 6.9 bar) at 50 cpm	
Inlet/Outlet Sizes		
Air inlet size	1/2 in. npt(f)	
Air exhaust port size	3/4 npt(f)	
Fluid inlet size	2-11.5 in. npt(f) or 2-11 in. bspt(f)	
Fluid outlet size	2-11.5 in. npt(f) or 2-11 in. bspt(f)	
Materials of Construction		
Wetted materials on all models	Aluminum	
Weight		
All models	76 lb	34.47 kg
Notes		
* Startup pressures and displacement per cycle may vary based on suction condition, discharge head, air pressure, and fluid type.		
‡ Sound pressure measured 3.28 feet (1 meter) from equipment. Sound power measured per ISO-9614-1.		
All trademarks or registered trademarks are the property of their respective owners.		



Fluid Temperature Range

NOTICE

Temperature limits are based on mechanical stress only. Certain chemicals will further limit the fluid temperature range. Stay within the temperature range of the most-restricted wetted component. Operating at a fluid temperature that is too high or too low for the components of your equipment may cause equipment damage.

Diaphragm, Check, or Seat Material	Fluid Temperature Range	
	Fahrenheit	Celsius
Buna-N	10° to 180°	-12° to 82°
Geolast	-40° to 180°	-40° to 82°
Santoprene®	-40° to 180°	-40° to 82°
TPE	-20° to 150°	-29° to 66°
Polychloroprene	14° to 176°	-10° to 80°

California Proposition 65

CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm – www.P65warnings.ca.gov.



Graco Standard Husky Pump Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

FOR GRACO CANADA CUSTOMERS

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Graco Information

For the latest information about Graco products, visit www.graco.com.

For patent information, see www.graco.com/patents.

TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.

Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211, **Fax:** 612-378-3505



All written and visual data contained in this document reflects the latest product information available at the time of publication. Graco reserves the right to make changes at any time without notice.

Original instructions. This manual contains English. MM 3A8693

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